EDWARDS AIR FORCE BASE • ENVIRONMENTAL MANAGEMENT DIVISION

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Report to STAKEHOLDERS

http://www.edwards.af.mil/penvmng/index.html

INSIDE

In this issue . . .

Knowledge gained — *Environmental Restoration Branch project manager Paul Schiff looks forward to putting the knowledge about cost and performance that a four-year long study of a perchlorate-selective ion exchange technology produced to work in future efforts at Site 285.*

Perchlorate studies continue at Site 285

A four-year long, full-scale study of perchlorate contamination at a north base site at Edwards Air Force Base (AFB) will be winding down December 2005. To conclude the study, the Air Force will be conducting two more demonstrations of technology that will help them know much more about practical solutions to perchlorate contamination. The Air Force also will be looking into other types of technologies at Site 285 and begin a new study to advance perchlorate technologies, this time involving bioremediation.

"Edwards is still working on perchlorate and will not be walking away at the end of our full-scale study of ion exchange technology," said Paul Schiff, project manager at Site 285 where the study for perchlorate began. "There are more

See *Perchlorate* page 6

If you have a question about the Edwards Air Force Base Environmental Management program, you may address it to Stakeholders Forum, Attn: Gary Hatch or Miriam Harmon, 5 E. Popson Ave., Edwards AFB, CA 93524-8060, or send e-mail to: afftc.em.com.rel@edwards.af.mil

Next RAB Meeting

August 25, 2005
5:30 p.m.
California City
(Location to be announced)

The public is invited.

Q. What types of outdoor recreational uses are permitted at Edwards Air Force Base (AFB)? How are these activities managed on the base?

A. Hiking, jogging, horseback riding, off-roading, hunting, fishing, wildlife photography and bird watching are typical of the outdoor recreational activities permitted and enjoyed at Edwards AFB.

The Air Force manages and provides guidance to make possible both the enjoyment of these outdoor activities and protection of natural resources that might be harmed by them. It is the Environmental Management (EM) Division's primary responsibility to manage natural resources at Edwards AFB. Outdoor recreation is one element of this responsibility.

The base provides specified areas for some outdoor recreational activities and such activities are strictly limited to these areas. Other types of restrictions on activities, such as hunting, fishing and off-roading, may also apply.

For instance, recreational off-roading is restricted to residents and must take place in two areas specified for the activity. As part of EM's responsibility, off-roaders receive information and education about the possible damage from off-roading to burrowing animals including the burrowing owl and a federally threatened species, the desert tortoise.

Hunting and fishing on the base is open to active duty and retired military, Department of Defense civilians, tenant organizations and contractor employees assigned to Edwards and their dependents and guests. Permits are required and may be purchased at Outdoor Recreation or the Rod and Gun Club on base. Waterfowl, quail, rabbit, bass and catfish are among the game and fish that can be legally taken on the base.

Clubs and services at Edwards AFB, such as the equestrian stables on base, can provide those interested in outdoor activities with information and assistance. The Natural Resources branch of the EM Division can also be a useful source of information for those with questions or in need of help. Birdwatchers, for instance, can obtain an access letter from EM in order to watch the many birds attracted to the Piute Ponds area on base. ■

Report to Stakeholders is a publication of the Edwards AFB Environmental Management Division. Its purpose is to inform and educate the public, base workers and residents about continuing Environmental Management efforts at Edwards AFB. It currently has a circulation of 6,000, including about 2,000 subscribers.

Contents of the *Report to Stakeholders* are not necessarily the official view of, or endorsed by, the U.S. government, the Department of Defense, or the Department of the Air Force.

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Report to **STAKEHOLDERS**

Commander 95th Air Base Wing..... Col. Drew D. Jeter
Base Civil Engineer..... James Judkins
Division Chief Environmental Management..... Robert Wood
Branch Chief Environmental Restoration..... David Steckel
Branch Chief Environmental Conservation..... Gerald Callahan
Branch Chief Environmental Quality..... Robert Shirley

Earth Day 2005

Environmental Fair organizers serve up people-friendly event

Organizers of an Earth Day environmental fair hosted by staff members of Environmental Management (EM) on April 22 set their sights on being people-friendly while they went about the business of sharing information on recycling, water-conserving landscaping and other efforts to protect the health of the environment and people living in it. The fair was open to all who live, work or attend school at Edwards Air Force Base (AFB).

"Focus for the fair is on providing activities that are interesting and educational," said Patti Kumazawa, a contractor with EM who coordinates the event. "We hope those who attend enjoy themselves and gain a better understanding of the variety of resources on the base that EM is helping to conserve."

With EM services covering natural and cultural resources, environmental quality, pollution prevention and restoration, it's a challenge to fit everything into one event, Kumazawa said.

Representing this array at the 2005 environmental fair were exhibits and activities ranging from a live snake display to a cruise-in that featured fuel-saving hybrid vehicles. Chemists, biologists, archaeologists and global information system technicians at EM lent a hand to round out the event. They provided wildflower tours, an archaeological dig, a desert tortoise "encounter," a treasure hunt using global positioning system (GPS) units and a GeoMedia interactive Web mapping display, a recycling display featuring two giant bales of crushed cans, and a chemistry demonstration on how to make "liquid nitrogen" ice cream.

"Many people at Edwards pass by the Environmental Management offices at the corner of Rosamond Boulevard and Popson Avenue each day," said Bob Wood, EM Division chief. "Although EM actually touches most operations on base, I'm sure some wonder what we do. The Earth Day environmental fair provides our staff with the opportunity to share information about our efforts and get to know the people on base we serve."

Continuing a tradition from previous years the fair has been held, students attending schools on base and in nearby communities were invited to participate in an Earth Day poster contest. A total of 426 entries were received from eight elementary, junior high and high schools in the area. The prize, which the first-place contest winner shares with his or her entire class, is an invitation to attend the environmental fair, share a pizza lunch with EM staff, and take a bus tour of Edwards sites.

This year's contest winner, Christina Matos, a junior at Desert High School on base, attended the fair accompanied by a dozen fellow art students. Describing her process in developing her prize-winning poster, Matos said her teacher had given the class several weeks to produce a design.

"I'm a procrastinator," Matos admitted, "so I waited until the assignment was due and I had about two hours to get it done." The connection with time running out sprang immediately to mind and a poster showing Earth dissolving inside an hour glass was born.

The first place award came as a surprise. "I don't think I'm that much of an artist, but the poster reflects my real concern about wasting nonrenewable resources," said Matos.

2005 Earth Day energizers *— An environmental fair held in conjunction with Earth Day 2005 gave those who work, live or attend school at Edwards Air Force Base an opportunity to power up on knowledge about environmental efforts at the base including resource conservation and pollution prevention.*

Photo top, a student poster contest, won by Christina Matos, an art student and junior at Desert High School on base, urges waste cutting ways. Center, water-conserving landscaping at the Environmental Management (EM) offices provides the setting for the fair. Below, live encounters with native species, like the king snake, were possible under the watchful eyes of EM biologist Andrea CurryLow and other environmental staff members.

Lizards of Edwards

Usually you catch only a glimpse of them ... a quick, darting shadow at the edge of vision. But if you're lucky and live and work at Edwards Air Force Base, you might be able to spot a bit more of the five most common types of lizards who call the base home.

If you ever come across a lizard in the desert, these pictures of what they look like will help you identify them. They should be left in the habitat they came from. It can be very difficult to provide the right diet and habitat to keep these wild animals alive and healthy in captivity.

Side Blotched

Size 1.5 — 2.25 in.*
Tan with blue blotches
Uses speed to escape from predators
Smallest of the local common lizards
Small size means this lizard can warm up faster and is active at times other common lizards are not
Insectivorous

A *Tail* of Sacrifice

Many lizards will sacrifice their tails to save the rest of their body. Tiny fracture planes allow the tail to be severed when the lizard is chased or captured by a predator. The tail will continue to wriggle and twist to attract the predator's attention, which often allows the lizard time to escape.

SOURCE: Craig Ivanyi and Stephanie Paulin in *Lizards of the Southwest*, Arizona-Sonora Desert Museum

Blue blotches

Horns on top

Desert Horned

Size 2 — 3 in.*
Mottled dark brown and beige coloring
Two distinctive “horns” along the base of the head and spiny scales across entire body
Can squirt blood from corner of eyes to scare off potential trouble
Insectivorous

Zebra Tailed

Speedster

Size 2 — 4 in.*
Light ground color of tan to beige
Black rings around the tail
Extremely fast moving and light on their feet
Often run with tails curled over their backs
Insectivorous

Desert Spiny

Size 3.25 — 5.5 in.*
Light ground color of tan to beige
Black, wedge-shaped markings on neck, looking something like a collar
Very spiny scales
Insectivorous

Black collar style

Western Whiptail

Size 2.5 — 4.5 in.*
Black ripple pattern on brown and gray
Distinctive jerky movements
Uses speed to escape from predators
Insectivorous

Darting and jerky

*NOTE: Size given does not include length of tail.

Photos by Mark Bratton, biologist with Edwards AFB Environmental Management Division contractor JT3/CH2M HILL.

New state director — *During an April 8 visit to Edwards Air Force Base, the newly appointed director of California's Department of Toxic Substances Control, B. B. Blevens, right, stops by at the Hazardous Waste Support Facility. Accompanying Blevens on the day-long tour were Environmental Management Division chief, Bob Wood, left, and others involved with environmental programs at the base.*

Perchlorate (from page 1)

studies to be done as a part of the overall ion exchange study and these will add to our knowledge of practical ways to treat perchlorate. We also will be conducting a small, new bioremediation study at Site 285 and investigating other promising perchlorate technologies through partnership under other funded programs."

A fourth and final breakthrough of the perchlorate selective ion exchange resin used in the full-scale study tops the list of work ahead.

Final breakthrough

A *breakthrough* occurs when resin beads used to trap perchlorate reach saturation. Resin made of synthetic polymeric materials acts like a magnet that attracts or pulls out the contaminant. The resin can later be cleaned, or regenerated.

As of March 2005, the Site 285 extraction system had treated over 18.5 million gallons of groundwater and removed 54 pounds of perchlorate. The resin beads in the lead vessel have been successfully regenerated three times.

"Regeneration does not appear to affect the performance of the resin beads," Schiff said. "The data from this final breakthrough should confirm what we learned from the other breakthroughs — this particular perchlorate-selective resin can be used over and over again."

The approach for a final system breakthrough involves a newly installed monitoring well at Site 285 that has been connected as an extraction well to the site's perchlorate extraction system. The well is located in a hot spot where high concentrations of perchlorate are detected in the groundwater.

"Tapping into this hot spot should increase the concentration and flow rate of perchlorate pumped into the extraction system," said David Steckel, chief of the Restoration Branch. The goal is to determine the efficiency of the resin over time. The study will compare data from the final breakthrough to three previous vessel breakthroughs as part of that determination.

"Over time, perchlorate concentration and flow rate have decreased as the perchlorate has been removed from the groundwater," Schiff said. "With the new extraction well, levels should increase to the same values we had when the extraction system started. This extraction well will benefit us three-fold. We will take high amounts of perchlorate out of the groundwater, achieve faster breakthrough on the system and obtain data comparable to the first breakthrough events."

Achieving a final breakthrough on the perchlorate extraction system is only part of the overall picture at Site 285. The full-scale ion exchange study also involves evaluating soil flushing of perchlorate and a resin comparison study.

Soil flushing

Soil flushing wets the ground using a buried sprinkler system that injects clean water over a patch of soil contaminated with perchlorate and pushes perchlorate through the soil to groundwater level. Probes are placed within the soil to track the movement of moisture from the sprinklers to groundwater level. When this wetting front reaches groundwater level, an existing well under the contaminated soil will extract the groundwater into the treatment system.

To determine the success of the soil flushing, the Restoration Branch will compare the amount of perchlorate in the soil prior to soil flushing to the amount of perchlorate in soil after the soil flushing study is complete. This study is expected to run for about six months.

Resin comparison study

This study compares the practicality of *toss* resin to the selective resin currently used at Site 285. Once toss resin beads are saturated, the resin is thrown away, or tossed.

"Toss resin is being used by other cleanup facilities," said Schiff. "It cannot be regenerated, but is much cheaper to purchase."

For accurate comparability, toss resin will treat a small stream of extracted groundwater along side a comparably sized canister of selective resin at Site 285. Unlike the resin currently in use at Site 285, toss resin is not selective for

Working to make perchlorate history

Construction on the Site 285 compound begins in 2001. Planned for the site was a full-scale field test of a selective ion exchange technology. The field portion of this study will be completed about December 2005.

Concern for communities surrounding Edwards Air Force Base expressed by Restoration Advisory Board (RAB) members prompted the Air Force, to fund a $3 milllion treatability study for perchlorate. RAB member Ruby Messersmith is pictured above with Environmental Management Division chief Bob Wood at a March 2003 ribbon cutting ceremony at Site 285.

The conclusion of the full-scale test of selective ion exchange technology at Site 285 will not mean the end of efforts to address perchlorate contamination at the site. More studies are planned that will help the Air Force compare cost and performance of various treatment methods.

perchlorate which means it will take out additional chemicals in the water and that, in turn, will use up the resin faster. A performance and cost data comparison between selective and toss resin could help determine which method would be a more effective approach for future perchlorate cleanup.

Bioremediation study

Later this year at Site 285, the Restoration Branch will inject a biochemical stimulant to act as a food source for microbes that break down perchlorate into chloride and oxygen. The existing Site 285 system will be used to pump sodium lactate into Site 285 groundwater to stimulate the microbes. Progress will be monitored by measuring the amount of perchlorate in the down-gradient and extraction wells. When the stimulant reaches the extraction well, the groundwater will be cycled back to the injection well for subsequent passage through the aquifer."

"One of the bonuses of bioremediation is that once the bugs are activated they will continue to break down perchlorate even after the stimulant is no longer being injected into the groundwater," Schiff said.

The Restoration Branch continues to pursue perchlorate treatment technology demonstrations through the Environmental Security Technology Certification Program (ESTCP), which is a DoD program that promotes innovative, cost-effective environmental technologies through demonstration and validation at DoD sites. An advantage of the ESTCP is that the demonstration projects are fully funded by the ESTCP, and not the Air Force.

For possible testing in the future, the Restoration Branch is also looking into a proposal from the Lawrence Livermore National Laboratory on a perchlorate removal system that uses membranes instead of resin beads. ■

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Published data and documents relating to the Environmental Restoration Program are available for public review in information repositories at four locations. The current information repositories are located in the cities of Boron, Lancaster and Rosamond, as well as Edwards AFB. They are updated when new documents are released.

If you have any questions about information in the repositories, please contact Gary Hatch, Environmental Public Affairs at (661) 277-1454 or through e-mail at gary.hatch@edwards.af.mil.

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